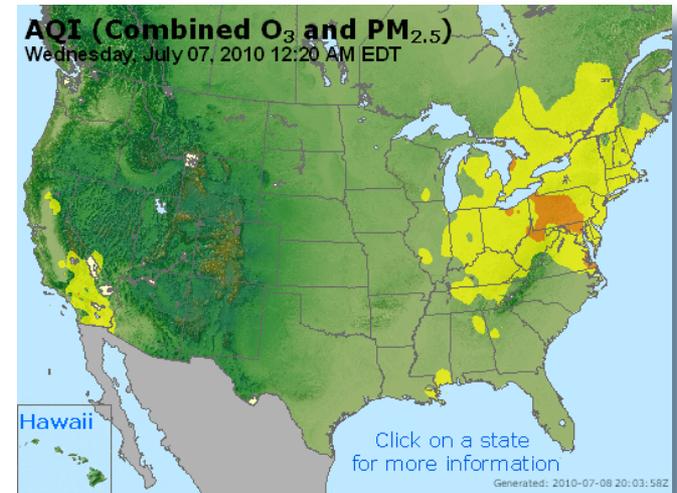


Data Quality Assurance and Quality Control in EPA's AirNow Program

Prepared by
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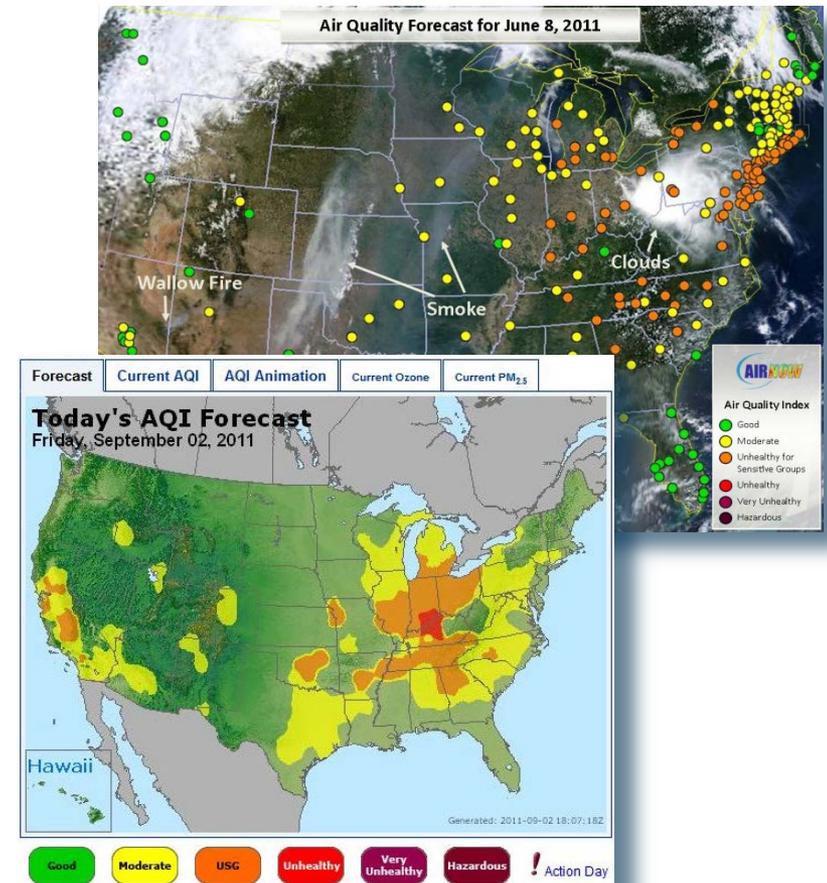
Presented at the
2012 AQS Conference
Providence, RI
August 23, 2012



About AirNow

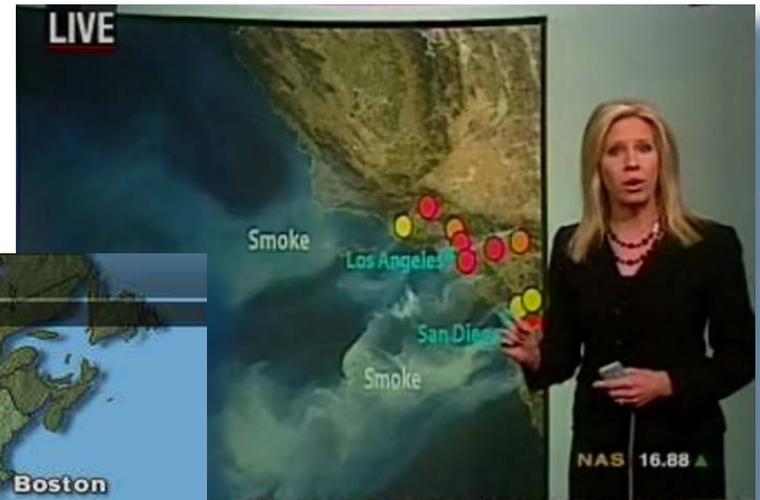
AirNow is the national framework for acquiring and distributing real-time, non-regulatory air quality information

- Collects, quality controls, and transfers real-time and forecasted air quality information to the public
- Data are provided by 130+ federal, state, and local air quality agencies
- Issues weather/air quality news stories
- Partners with national media
- Provides air quality education and outreach



AirNow Tools: Media

- Air quality news stories and graphics
- Event coverage (wildfires and emergencies)



AirNow Products

AirNow.gov

- Main public source for nationwide air quality data
- Current and archived ozone and fine particulate matter (PM_{2.5}) maps

AirNow Gateway

- Data products available via FTP and web services

EnviroFlash

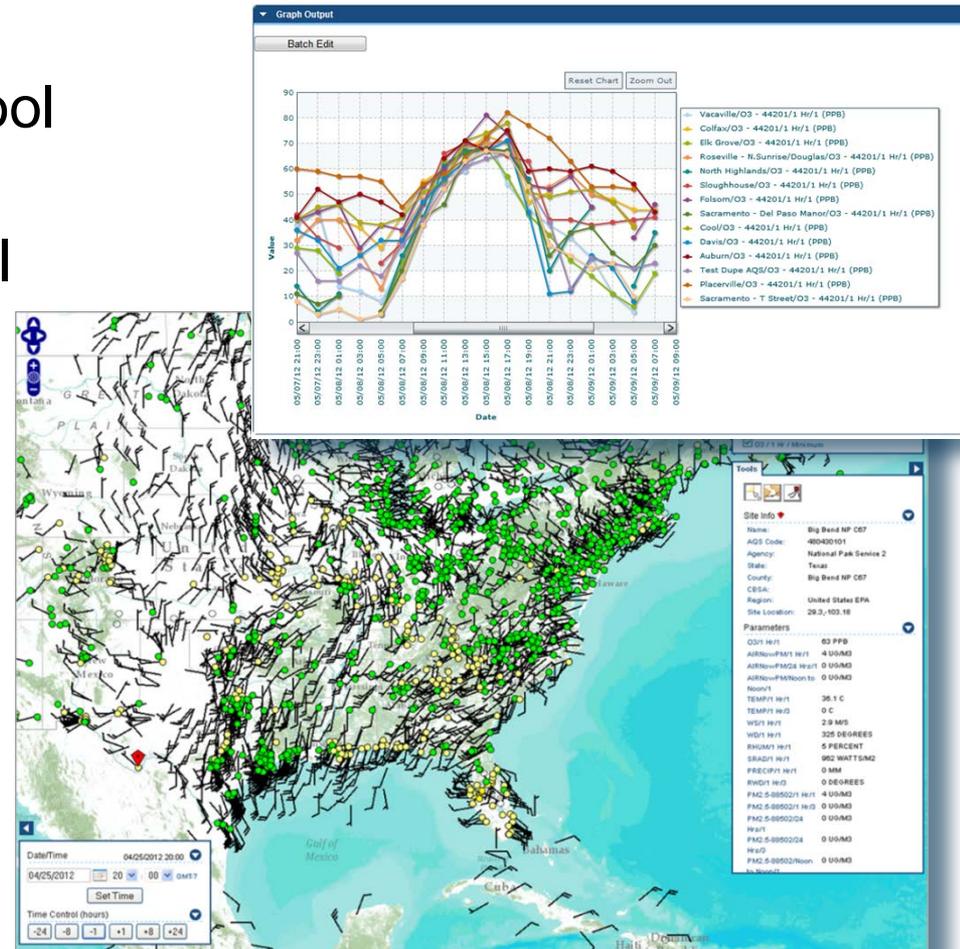
- EPA's free email system for Air Quality Index (AQI) forecast notices and real-time alerts (www.EnviroFlash.info)



AirNow-Tech

AirNow Decision Support System

- Password-protected data management and analysis tool for the AirNow Program
- Ability to view meteorological and air quality data
- Geographic Information System (GIS) functions: HYSPLIT trajectory tool, satellite, and smoke products
- Data editing available with AirNow-Tech 2.0 this fall

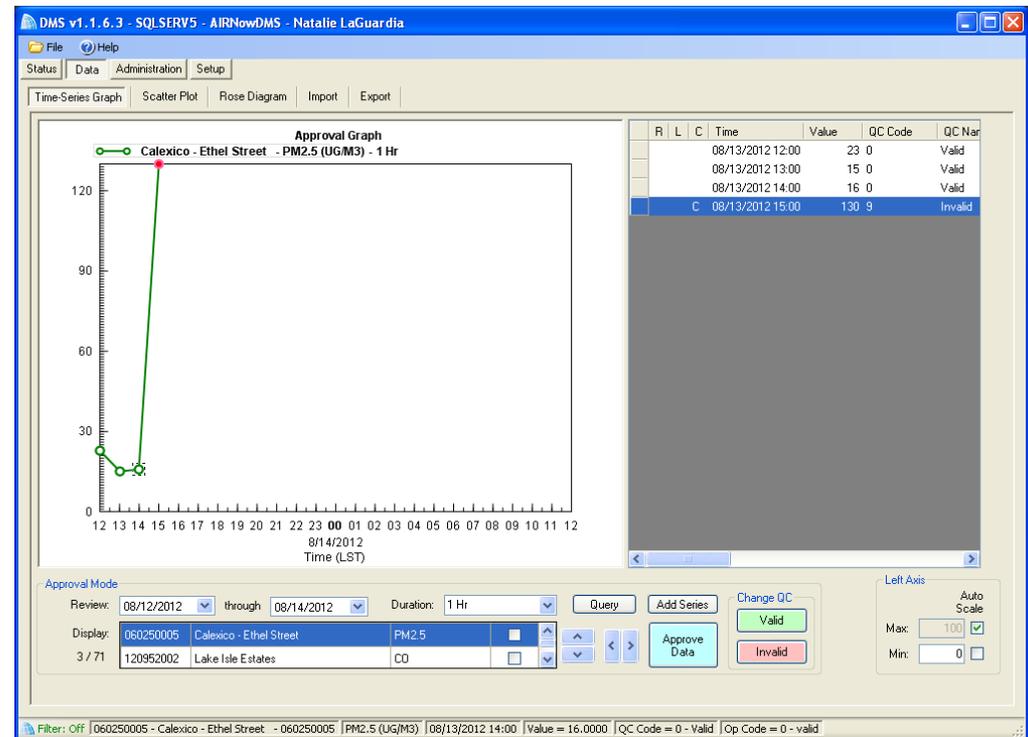


*HYSPLIT: Hybrid Single Particle
Lagrangian Integrated Trajectory Model*

Quality Control (QC)

Two Layers of QC at the Data Management Center (DMC)

- 24-hour automatic QC checks applied to real-time data
- Daily manual data review during business hours (8:00 a.m. to 5:00 p.m., seven days a week)



Quality Control: Automatic Checks

Automatic QC checks are available for all air quality and meteorological parameters

- Can be unique for each hour
- Agencies can edit these checks

Hourly values automatically checked according to

- Range – “Max Suspect” and “Max Severe”
- Rate of Change
- Sticking – “# of Sticking Hours” and “Sticking Value”
- Low-Value – “Minimum Drift”
- *Buddy (this fall with AirNow-Tech 2.0)*

Parameter: [Buddy Sites](#)
 [QC Descriptions](#)

Quality Control Criteria

Hour (LST)	Max Suspect	Max Severe	Rate of Change	# of Sticking Hours	Sticking Value	Minimum Drift
0000	70.00000	90.00000	30.00000	5	40.00000	-4.90000
0100	70.00000	90.00000	30.00000	5	40.00000	-4.90000
0200	70.00000	90.00000	30.00000	5	40.00000	-4.90000
0300	70.00000	90.00000	30.00000	5	40.00000	-4.90000
0400	70.00000	90.00000	30.00000	5	40.00000	-4.90000
0500	70.00000	90.00000	30.00000	5	40.00000	-4.90000
0600	70.00000	90.00000	30.00000	5	40.00000	-4.90000
0700	80.00000	100.00000	30.00000	5	40.00000	-4.90000
0800	90.00000	110.00000	30.00000	5	40.00000	-4.90000
0900	100.00000	120.00000	30.00000	5	40.00000	-4.90000
1000	110.00000	130.00000	30.00000	5	40.00000	-4.90000
1100	110.00000	130.00000	30.00000	5	40.00000	-4.90000
1200	120.00000	140.00000	60.00000	5	40.00000	-4.90000
1300	130.00000	150.00000	60.00000	5	40.00000	-4.90000
1400	130.00000	150.00000	40.00000	5	40.00000	-4.90000
1500	130.00000	150.00000	40.00000	5	40.00000	-4.90000
1600	120.00000	140.00000	40.00000	5	40.00000	-4.90000
1700	120.00000	140.00000	40.00000	5	40.00000	-4.90000
1800	120.00000	140.00000	40.00000	5	40.00000	-4.90000
1900	110.00000	130.00000	40.00000	5	40.00000	-4.90000
2000	110.00000	130.00000	40.00000	5	40.00000	-4.90000
2100	90.00000	110.00000	40.00000	5	40.00000	-4.90000
2200	90.00000	110.00000	40.00000	5	40.00000	-4.90000
2300	80.00000	100.00000	40.00000	5	40.00000	-4.90000

Parameter: **Buddy Sites****Quality Control Criteria**[QC Descriptions](#)

Hour (LST)	Max Suspect	Max Severe	Rate of Change	# of Sticking Hours	Sticking Value	Minimum Drift
0000	70.00000	90.00000	30.00000	5	40.00000	-4.90000
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2000	110.00000	130.00000	40.00000	5	40.00000	-4.90000
2100	90.00000	110.00000	40.00000	5	40.00000	-4.90000
2200	90.00000	110.00000	40.00000	5	40.00000	-4.90000
2300	80.00000	100.00000	40.00000	5	40.00000	-4.90000

Quality Control: Parameters

By default, QC checks are automatically assigned for these air quality and meteorological parameters

Air Quality Parameters	Meteorological Parameters
Ozone	Barometric pressure
PM _{2.5}	Relative humidity
PM ₁₀	Solar radiation
Black carbon, UV-Aeth	Ambient temperature
Carbon dioxide (CO)	Wind direction
Nitric oxide (NO), nitrogen dioxide (NO ₂), reactive nitrogen (NO _y), oxides of nitrogen (NO _x)	Wind speed
Sulfur dioxide, sulfate (SO ₂ , SO ₄)	

Quality Control: Example of Default Checks

Default QC check example:
QC range checks for hourly ozone

Hour Range	Max Suspect*	Max Severe
0:00 – 6:00	60 ppb	75 ppb
7:00 – 12:00	80 ppb	95 ppb
13:00 – 15:00	100 ppb	120 ppb
16:00 – 18:00	110 ppb	130 ppb
19:00 – 20:00	90 ppb	115 ppb
21:00 – 22:00	70 ppb	95 ppb
23:00	60 ppb	80 ppb

* Values flagged as suspect are subjected to manual review, but are still used in public AirNow products

Quality Control: Buddy Sites in AirNow-Tech 2.0

Compare hourly data values to those at nearby stations. Settings include:

- Selected monitoring sites
- **Threshold** – absolute concentration difference allowed between monitors
- **Minimum Number of Buddy Sites** (that must be below the **Threshold**)

Edit Buddy Sites for Sacramento - Del Paso Manor O3

Buddy Settings

Parameter(s): Parameter Selector

Site(s): Site Selector

Filtered Data Set(s):

Selected Data Set(s):

Threshold:

Minimum Number of Buddy Sites:

Quality Control: Batch Editing

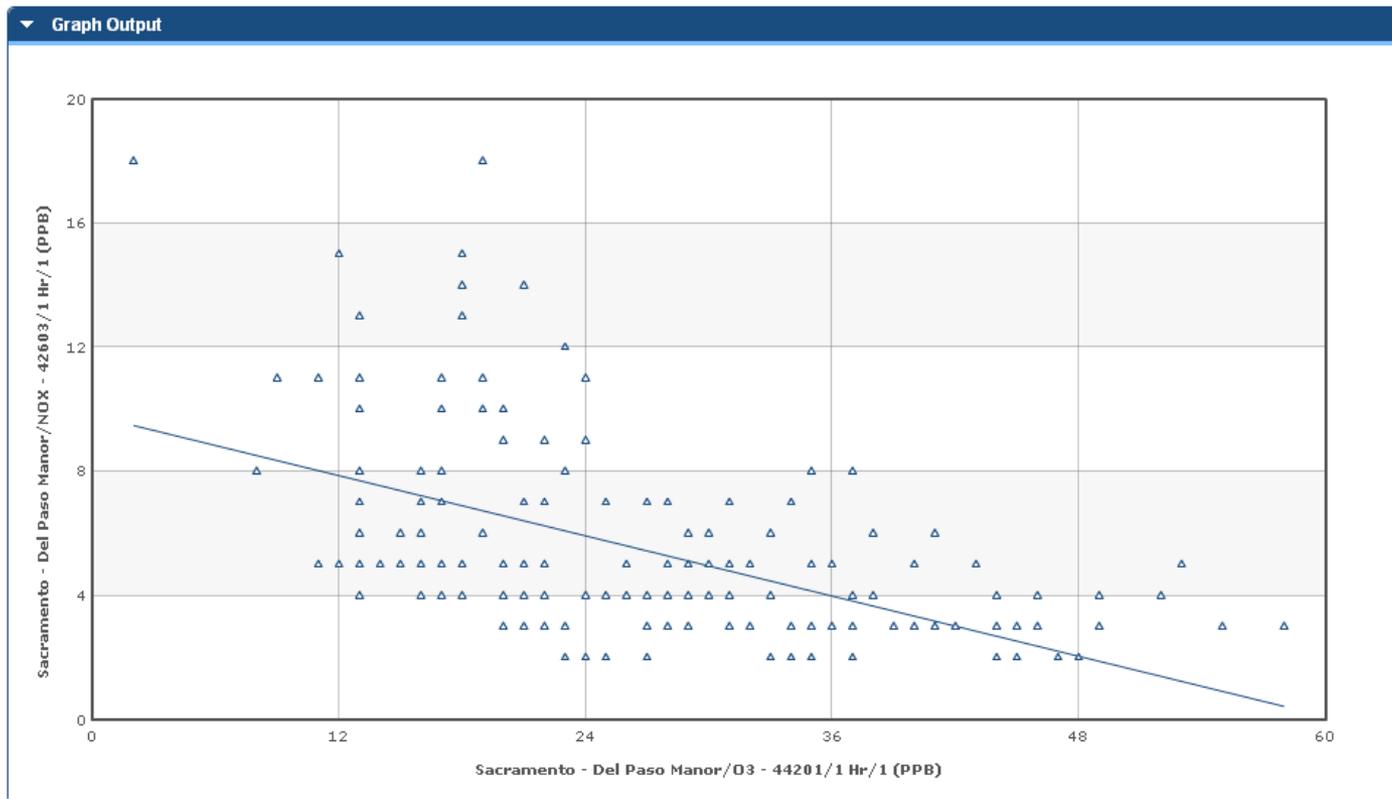
Batch editing data or QC flags in AirNow-Tech 2.0

The screenshot displays the 'Graph Output' window in AirNow-Tech 2.0. The graph shows 'Value' on the y-axis (0 to 120) and 'Date' on the x-axis (04/15/12 11:00 to 04/15/12 18:00). A 'Batch Edit' button is visible above the graph. A dialog box is open over the graph, allowing for data or QC flag editing. The dialog includes a 'Date Range' field set to '04/15/12 11:00 to 04/15/12 19:00', a list of series to edit (Auburn/O3/1 Hr/1, Colfax/O3/1 Hr/1, Sacramento - Del Paso Manor/O3/1 Hr/1, Elk Grove/O3/1 Hr/1), a 'QC Code' dropdown set to 'No QC code change', and options for applying bias and scaling or setting values. The dialog also features 'Execute Batch Edit' and 'Cancel' buttons.

Date	Auburn/O3/1 Hr/1	Colfax/O3/1 Hr/1	Sacramento - Del Paso Manor/O3/1 Hr/1	Elk Grove/O3/1 Hr/1
04/15/12 11:00	40	38	40	38
04/15/12 12:00	42	42	42	42
04/15/12 13:00	44	44	44	44
04/15/12 14:00	45	45	45	45
04/15/12 15:00	47	47	47	47
04/15/12 16:00	48	48	48	48
04/15/12 17:00	49	49	49	49
04/15/12 18:00	48	48	48	48

Quality Control: Comparing Data

Also in AirNow-Tech 2.0, scatterplots can be used to compare data between different sites and parameters



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